Figure 1-1. HP 85027B in Accessory Case Supplied

SECTION 1

GENERAL INFORMATION

INTRODUCTION

You will find operating and service information for the Hewlett-Packard 85027A, 85027B and 85027C directional bridges in this manual. When the three different bridges share a common trait or procedure, they will be referred to as the HP 85027. The HP 85027B in its case is illustrated in Figure 1-1. Figure 1-2 shows all three directional bridges. The rest of this section describes specifications, supplemental performance characteristics, safety considerations, instrument identification, description, and other basic information.

You may order this manual in microfiche form as part number 85027-90002. With the manual (in 4 x 6 inch microfilm transparency format) you will also receive the latest manual changes supplement and all pertinent service notes in print form.

SPECIFICATIONS

Table 1-1 lists the specifications for the HP 85027 directional bridges. The specifications are performance standards or limits against which the bridges may be tested. Table 1-2 lists supplemental characteristics, non-warranted but typical performance parameters, useful in test applications.

SAFETY CONSIDERATIONS

The voltages in these directional bridges do not warrant more than normal caution for operator safety.

CAUTION

The CAUTION sign in this manual identifies an operating procedure or practice which, if not correctly performed, could damage or destroy the equipment. Do not proceed beyond a CAUTION sign until you fully understand and meet the conditions indicated.

INSTRUMENTS COVERED BY MANUAL

You will find a two-part serial number on the bridge. The first four digits and the letter are the serial number prefix. The last five digits are the sequential suffix which is unique to each bridge. The contents of this manual apply directly to bridges with the same serial number prefix as the one on the title page under the heading SERIAL NUMBERS.

If the serial prefix of your bridge is not listed on the title page, your instrument is different from those documented in this manual. The differences are documented in the yellow manual changes supplement supplied with the manual.

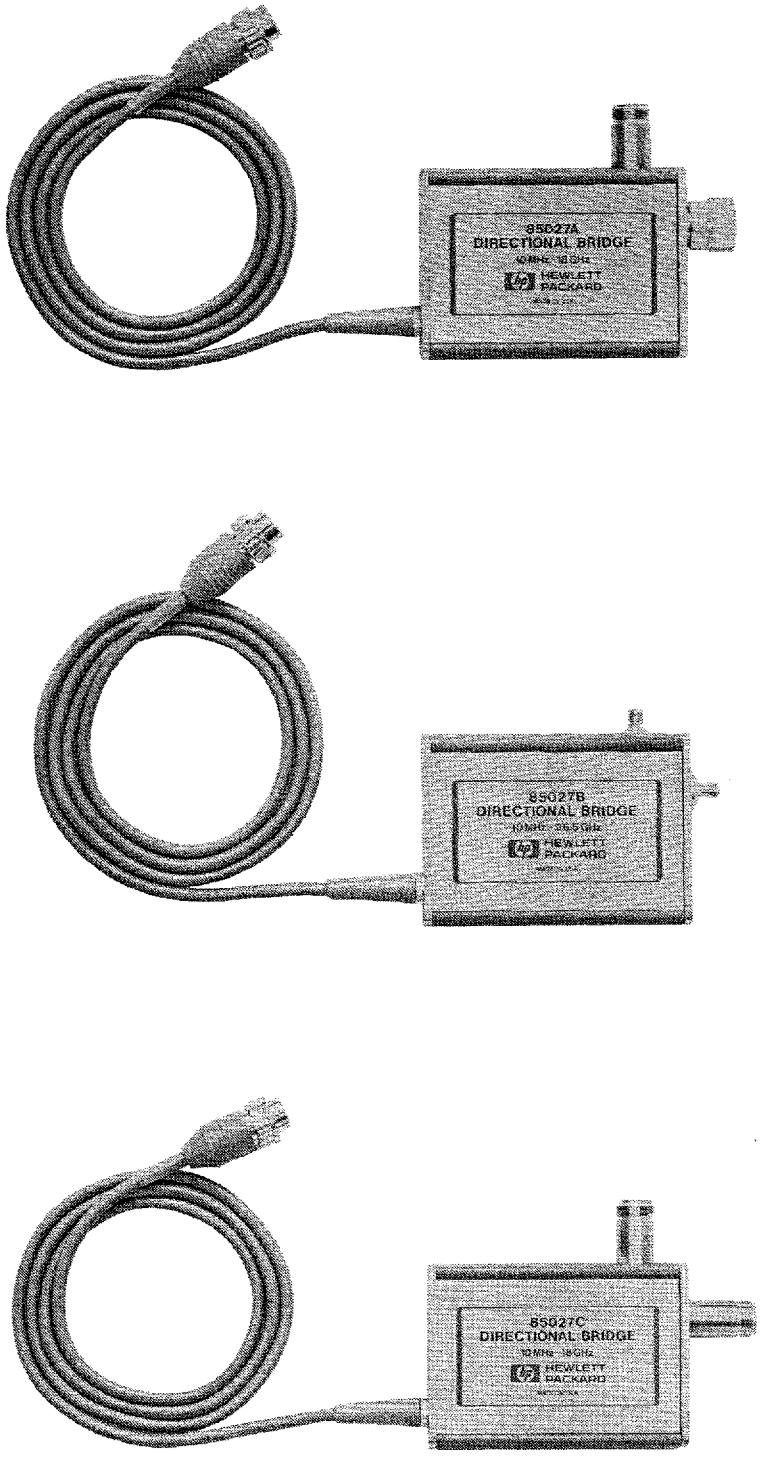


Figure 1-2. HP 85027A, 85027B and 85027C Directional Bridges

To keep this manual as current and accurate as possible, Hewlett-Packard recommends that you periodically request the latest manual changes supplement as it may contain error correction information as well as change information. The supplement for this manual is keyed to the manual's print date and part number (on the title page) and is available free from Hewlett-Packard.

DESCRIPTION

The HP 85027 bridges are microwave directional bridges designed for making modulated (AC) or unmodulated (DC) scalar reflection measurements with the HP 8757A scalar network analyzer and AC measurements with the HP 8765A and HP 8755C. A single zero-biased Schottky diode detector in the bridge performs reflection measurements by sampling the return loss of the device under test. A detector can be added for simultaneous transmission measurements. A power splitter can be used with the bridge or detector or both for ratio measurements. In all modes, typically the RF input signal is supplied by a sweep oscillator or a synthesized sweeper.

The frequency range and connector type of each bridge appears below and in Table 1-1.

	HP 85027A	**HP 85027B**	**HP 85027C**
Frequency range (GHz)	0.01 to 18.0	0.01-26.5	0.01-18.0
Input Connector	Type N (f)	3.5mm (f)	Type N (f)
Test Port Connector	APC-7*	3.5mm (f)	Type N (f)

*APC-7 is a registered trademark of the Bunker-Ramo Corporation.

EQUIPMENT REQUIRED BUT NOT SUPPLIED

The following equipment is required for use with the HP 85027 in making reflection, transmission and ratio measurements:

Scalar Network Analyzer

The frequency range of the three following analyzers is determined by the HP 85027 directional bridge in use.

HP 8757A: this scalar network analyzer is a microprocessor based four-channel, three input (four with Option 001) receiver with integral digital display. At RF and microwave frequencies, it makes scalar transmission and reflection measurements over a dynamic range of +16 dBm to -60 dBm and amplitude ratio measurements up to 152 dB. The HP 8757A is completely programmable through HP-IB (Hewlett-Packard Interface Bus, HP's hardware, software, documentation and support for IEEE-488 and IEC 625). Additionally the HP 8757A can control a plotter, a printer, such as the Thinkjet printer, and a swept source through the 8757 System Interface.

The HP 8757A offers both AC and DC detection techniques. The AC technique involves modulating the **source** signal at 27.8 kHz. Note that in this manual the modulation frequency of 27.8 kHz is actually 27.778 kHz. The DC detection technique modulates the input signal at 27.8 kHz within the bridge, after the DUT.

HP 8756A: this scalar network analyzer is also a microprocessor based receiver with its own digital display. With its dual channels, it makes scalar transmission and reflection measurements at RF and microwave frequencies over a dynamic range of -50 dBm to +10 dBm. It can measure amplitude ratios up to 60 dB. It is completely

programmable through HP-IB and can control a plotter and swept source through the 8756 System Interface.

The HP 8756A is only capable of AC mode measurements with the HP 85027 directional bridges.

HP 8755C: although this scalar network analyzer is not programmable, it also measures amplitude levels of -50 dBm to +10 dBm and amplitude ratios of 60 dB. Like the HP 8756A, the 8755C is capable of AC mode measurements only.

The HP 8755C plugs into a HP 180 series display mainframe such as the HP 182T or 180TR. If your application requires memory or normalization, use this analyzer with the HP 8750A Storage Normalizer. Refer to Section 1 of the HP 8755C Operation and Service manual for additional information on HP 8750A/8755C compatibility.

Swept Signal Source

HP 8350B: This sweep oscillator mainframe, for one, is a good source for the HP 85027 bridges mated to the HP 8757A because it is solid-state, fully HP-IB programmable and can be controlled by the HP 8757A through the 8757 System Interface. It has internal 27.8 kHz square wave modulation capability and, depending on the RF plug-in selected, can cover the entire frequency range of 0.01 to 26.5 GHz.

HP 8340A: this synthesized sweeper is also fully HP-IB programmable and can be controlled by the HP 8757A. It does not require a plug-in as it is a complete analog sweep synthesizer. It generates synthesized output frequencies from 0.01 to 26.5 GHz. The HP 8340A can be square wave modulated at 27.8 kHz by the HP 8757A.

HP 8341A: this synthesized sweeper differs from the HP 8340A (above) in frequency range: 0.01 to 20.0 GHz.

Detectors

One or more HP 85025A/B detectors are used with the HP 85027 directional bridges and the HP 8757A to make transmission measurements in AC or DC mode. The HP 85025A has a frequency range of 10 MHz to 18 GHz and uses a type-N connector (Option 001, APC-7 connector). The HP 85025B has a frequency range of 10 MHz to 26.5 GHz and uses a precision 3.5mm connector. Detection in the AC and DC mode is similar to that of the HP 85027. For AC mode transmission measurements, the HP 11664A/E detector may be used.

Power Splitter

Ratio measurements can be made with the addition of a power splitter. The HP 11667A has a frequency range of DC to 18 GHz; the HP 11667B, DC to 26.5 GHz.

EQUIPMENT AVAILABLE

Additional equipment available for use with the HP 85027 directional bridges and the HP 8757A scalar network analyzer is listed in Section 1 of the analyzer's Operating and Service Manual.

ACCESSORIES AVAILABLE

System verification kits, precision adapters and other miscellaneous accessories available are listed in Table 1-4. Note that the system verification kits are designed so that the

phase response of the short is exactly opposite that of the shielded open and thus provides the best possible calibration data.

RECOMMENDED TEST EQUIPMENT

Table 1-5 lists equipment recommended for use in performance testing the HP 85027 bridges. Other equipment may be substituted if its specifications meet or exceed the specifications listed in the Critical Specifications column.

WARRANTY RESTRICTIONS

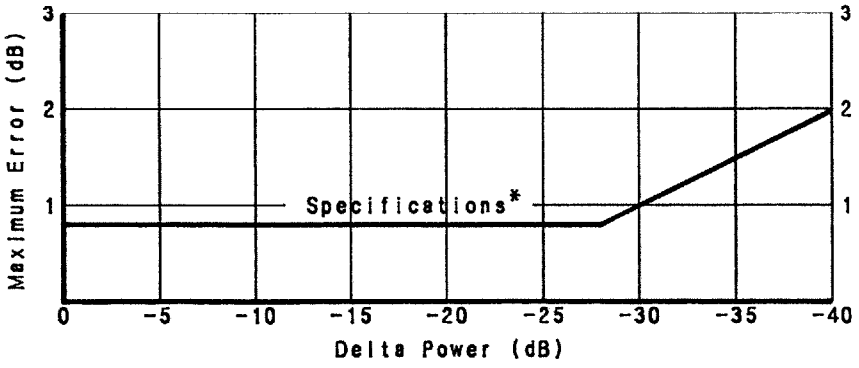
Performing any disassembly or repair procedure not included in Section 8, Service, of this manual will void the warranty.

Subjecting a HP 85027 bridge to RF input power levels in excess of +23 dBm or ±10 volts will likewise void the warranty.

Connector damage caused by mating with out of spec connectors or improper technique is not covered by the warranty. (See "Connector Inspection" in Section 8, Service.)

Table 1-1. Specifications

	HP 85027A	HP 85027B	HP 85027C
Frequency Range (GHz)[1]	0.01-18.0	0.01-26.0	0.01-18.0
Connector: Input	Type N (f)	3.5mm (f)	Type N (f)
Test port	APC-7	3.5mm (f)	Type N (f)
Max. Input Power	+23 dB or +-10 volts	+23 dB or +-10 volts	+23 dB or +-10 volts
Directivity[2]			
0.01 to 12.4 GHz	>=40 dB	>=40 dB	>=36 dB
12.4 to 18.0 GHz	>=40 dB	>=40 dB	>=34 dB
18.0 to 20.0 GHz	------	>=40 dB	------
20.0 to 26.5 GHz	------	>=36 dB	------
Test Port Match[2]			
0.01 to 8.4 GHz	>=23 dB	>=23 dB	>=23 dB
8.4 to 12.4 GHz	>=19 dB	>=15 dB	>=19 dB
12.4 to 18.0 GHz	>=17 dB	>=15 dB	>=17 dB
18.0 to 20.0 GHz	------	>=15 dB	------
20.0 to 26.5 GHz	------	>=11 dB	------



Dynamic Power Accuracy

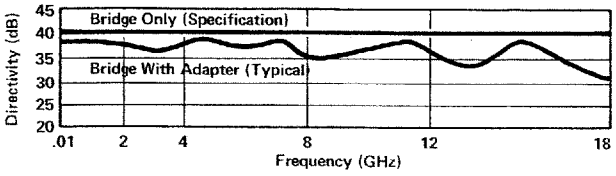
Dimensions	26 mm high x 124 mm wide x 118 mm deep (1.0" x 4.9" x 4.4")
cable length	1219 mm (48")
Weight	net: 0.5 kg (1.2 lb) shipping: 2.3 kg (5 lb)

[1] Unless otherwise noted, all specifications apply from 0°C to +55°C.
[2] +25°C +–5°C.

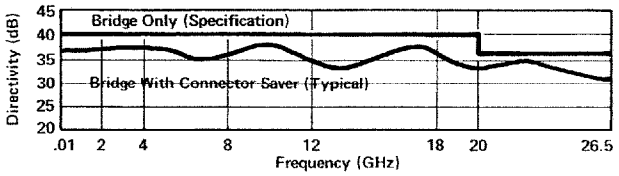
Table 1-2. Supplemental Characteristics

Values in this table are not specifications but are typical, non-warranted performance parameters included for user information.

Typical Directivity with Connector Savers (Adapters)
(To 3.5mm male or female)



HP 85027A



HP 85027B

	HP 85027A	HP 85027B	HP 85027C
Typical Insertion Loss			
at 0.01 GHz	6.5 dB	6.5 dB	6.5 dB
at 18.0 GHz	8.0 dB	8.0 dB	8.0 dB
at 26.5 GHz	-----	10.0 dB	-----
Typical Input Port Match			
0.01 to 8.4 GHz	>=20 dB	>=20 dB	*>=20 dB*
8.4 to 18.0 GHz	>=15 dB	>=15 dB	*>=15 dB*
18.0 to 26.5 GHz	-----	>=10 dB	-----
Typical Min. Input Power for a 40 dB Return Loss at 18 GHz			
HP 8757A	+2 dBm	+2 dBm	+2 dBm
HP 8756A/55C	+7 dBm	+7 dBm	+7 dBm
Typical Impedance	50 ohms	50 ohms	50 ohms

Table 1-3. System Verification Kits

HP 85023A (APC-7)
for use with HP 85027A

Qty	Accessory	HP Part or Model No.
1	APC-7 open/short	85021-60001
1	N (m) to N (m) adapter	1250-1475
1	APC-7 50 ohm termination	909A
1	APC-7 10 dB pad	8492A opt 010
1	instrument case	9211-1582
1	operating note	85023-90001

HP 85023B (3.5mm)
for use with HP 85027B

Qty	Accessory	HP Part or Model No.
1	3.5mm open/short	85037-60001
1	3.5mm (m) to N (m) adapter	1250-1743
1	3.5mm 50 ohm termination	909D
1	3.5mm 10 dB pad	8493C opt 010
1	instrument case	9211-1582
1	operating note	85023-90003

HP 85023C (Type-N)
for use with HP 85027C

Qty	Accessory	HP Part or Model No.
1	Type-N short	11512A
1	Type-N open	85032-60001
1	N (m) to N (m) adapter	1250-1475
1	Type-N 50 ohm termination	909A opt 012
1	Type-N 10 dB pad	8491B opt 010
1	instrument case	9211-1582
1	operating note	85023-90005

Table 1-4. Accessories Available

ADAPTERS/CONNECTOR SAVERS

Connector	3.5mm m	3.5mm f	N m	N f
APC-7	1250-1746	1250-1747	11525A	11524A
3.5mm m	85027-60002	85027-60003	1250-1743	1250-1750
3.5mm f		1250-1749	1250-1744	1250-1745
N m			1250-1475	--
N f				1250-1472

GENERAL

APC-7 contact extractor	5060-0236
APC-7 connector service kit	11591A
wrench, thin open end 1/2" x 9/16"	8710-0877
anti-static wrist strap	9300-0791

Table 1- 5. Recommended Test Equipment

Instrument	Critical Specifications	85027A	85027B	85027C
Scalar Network Analyzer	85027 AC/DC compatible	8757A	8757A	8757A
Sweep Oscillator with RF Plug-in	8757A compatible	8350B with	8350B with	8350B with
	Frequency: 0.01 to 18 GHz	83592A/B		83592A/B
	Frequency: 0.01 to 26.5 GHz	or 83595A	83595A	or 83595A
or Synthesized Sweeper	Frequency: 0.01 to 20 GHz	8341A		8341A
	Frequency: 0.01 to 26.5 GHz		8340A	
Detectors (2)	Frequency: 0.01 to 18 GHz	85025A		85025A
	Frequency: 0.01 to 26.5 GHz		85025B	
Power Splitter	Frequency: 0.01 to 18 GHz	11667A		11667A
	Frequency: 0.01 to 26.5 GHz		11667B	
Power Meter	Frequency: 0.01 to 26.5 GHz	436A	436A	436A
Power Sensor	Frequency: 0.01 to 18 GHz Connector: Type-N (f)	8481B		8481B
	Frequency: 0.05 to 26.5 GHz Connector: 3.5mm		8485A	
10 dB Step Attenuator	Frequency: dc to 4 GHz Connector: Type-N (f)	8495A opt 001		8495A opt 001
	Frequency: dc to 26.5 GHz Connector: 3.5mm		8495D opt 004	
50 ohm Fixed Load	APC-7	909C		
	3.5mm		909D/040	
	Type-N			909C/012
50 ohm Sliding Load	APC-7/Type-N, 1.8 to 18 GHz	905A		905A
	3.5mm, 2 to 26.5 GHz		911C	
Digital Multimeter	Accuracy: ±0.01% Input Impedance: >=10MΩ	3456A	3456A	3456A
This equipment is used for performance testing, adjustment and troubleshooting.				